

# Green Mobile Networks & Base Stations

## Strategies, Scenarios & Forecasts 2009-2014

### Scenario based forecasts – Renewal energy analysis

This strategic report provides unique scenario based forecasts (incremental, progressive and transformational) for green mobile base station deployments as well as total on-grid and off-grid base station power consumption forecasts, base station electricity costs and CO2 emissions, all split by eight key regions for six years.

Drawing on a series of in-depth interviews with senior executives from network operators and infrastructure vendors, the report focuses on means of improving efficiency within the base station, analysing techniques such as reduced air conditioning, network planning, automated meter readings, remote radio head deployment and the use of feederless sites.

The various options for renewable energy including solar power, wind, biodiesel, fuel cells and pico-hydro are discussed at length and the possibilities for, and constraints of, each method are analysed.

#### Key Questions Addressed by this Report:

- What commercial benefits will the introduction of environmentally sustainable business practices bring to the mobile industry?
- What strategies should operators utilise to reduce energy wastage in the network?
- To what extent will the widespread deployment of energy efficient base stations reduce CO2 emissions from the mobile network?
- Which vendors and operators have thus far been most proactive in promoting and implementing green policies?
- Which operators currently offer networks fuelled by renewable energy?
- How much will the deployment of off-grid base stations fuelled by renewable energy reduce operator electricity costs?

#### Key Benefits:

- A unique source of combined research and analysis for the green mobile market including technologies, market characteristics and forecasts.
- Practical analysis of the emerging opportunities for vendors and operators.
- Unique insights: includes interviews of leading players with significant experience of the green mobile market.
- Benefit from fresh thinking and intelligent market assessment.



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# Green Mobile Networks & Base Stations: Analysis & Forecasts

## report overview

This report explores environmentally sustainable business practices in areas such as data centres, transport and logistics whereby operators and vendors are seeking to reduce their overall carbon footprint.

The report also includes case studies of renewable energy deployments and an overview of key industry initiatives in this area (including the GSMA Green Power Initiative and the IPP Pilot Project), together with a discussion of key international legislation.

## analysis & forecasts

### Report Analysis

**6 Year Analytical Forecasts** provide an extensive market focus on the emerging opportunities for green mobile networks and base stations across key regions until 2014.

**Split by 8 Key Regions** North America; South America; Western Europe; Eastern Europe; Far East & China; Indian Sub Continent; Rest of Asia Pacific and Africa & Middle East.

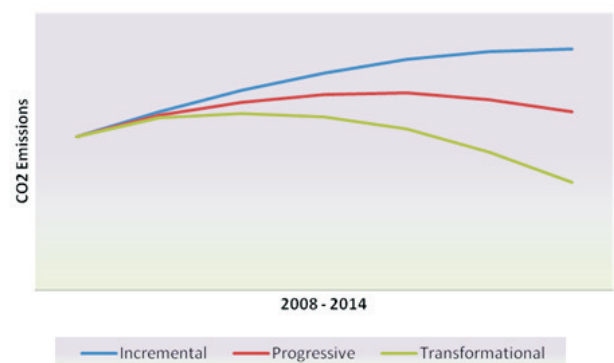
**Complete Market Breakdown** combines a thorough appraisal of key regulatory, consumer-driven and economic drivers; with profiles and real-world case studies of renewable energies, efficiency drives and insider interviews from a series of prominent senior executives.

**Visual Clarity** with 56 tables and 39 full colour forecast charts.

### Market Forecast Suite 2009-2014

**Base Station** deployments; those which utilise renewable energy; electricity generated by off-grid renewables; annual power generation from off-grid renewable resources; CO2 emissions (on-grid); emissions from off-grid electricity; total emissions: incremental; progressive; transformational scenario; comparison

### Co2 Emissions From Base Station Electricity, By Scenario, 2008 to 2014



**Power Consumption & Electricity Costs** implied cost of base station electricity; power output per base station; total mobile base station power consumption; total operator base station electricity costs; total costs in relation to operator-billed revenues; electricity usage per mobile subscriber: incremental; progressive; transformational scenarios

## our background

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## Executive Summary

### 1. Operating Systems

#### Introduction

#### The Global Drive for Climate Change

- United Nations Framework Convention on Climate Change (UNFCCC)
- Regional and national legislation: European Union; carbon trading (obligations and opportunities)

#### Key Drivers for Environmentally Sustainable Business Practices

- Regulatory: existing CO2 levels must be reduced to protect environment
- Consumer-driven: environmental considerations are influencing choice of product
- Economic: the need for energy efficiency; the rising costs of fossil fuels

#### The Industry Response: Integrated Product Policy (IPP) Pilot Project

- ICT impacts and opportunities; IPP pilot project stages

#### The Growth of the Mobile Market and its Environmental Impact

- Mobile user base: subscriber base forecasts
- The growing demand for base stations: subscribers per active base station; active base stations
- CO2 emissions across the mobile industry: consumers; radio base station; network control, core & data servers
- Reducing the footprint

#### Three Scenarios: Incremental, Progressive, Transformational

### 2. Powering the Network

#### Key Forms of Renewable Energy

- Solar energy; Wind (turbine designs)
- Other forms of renewable energy: pico-hydro power; biodiesel; fuel cells

#### Renewable Energy in Developed Markets

- Selected operators and vendors, percentage green electricity utilisation

#### Renewable Energy in Developing Markets

- GSMA Green Power initiative
- Renewable energy deployments in developing markets - case studies: Vodafone/Vodacom; Nokia Siemens Networks/ETC Ethiopia; Safaricom

#### Constraints on Renewable Energy

- Wind energy: geographic location; cost; turbine design
- Solar energy: geographic location; cost
- Other renewable resources: biodiesel

#### Which Renewable Energy Resource?

- Developing markets: Capex and Opex; Location; Load requirements

### 3. Base Station Forecasts

#### Base Station Deployments

- Base station deployments p.a.; Percentage of annual deployments of base stations which utilise renewable energy; Annual deployments of base stations that utilise renewable energy: incremental; progressive; transformational scenario

#### Green Electricity

- Total base station electricity generated by off-grid renewable resources; Annual power generation from off-grid renewable resources: incremental; progressive; transformational scenario

#### CO2 Emissions

- CO2 emissions of base station grid electricity; On-grid base stations, CO2 emissions: incremental; progressive; transformational scenario

#### Emissions from Off-Grid Electricity

- Base station electricity derived from diesel-powered off-grid generators; Off-grid base stations, CO2 emissions: incremental; progressive; transformational scenario

#### Total Base Station CO2 Emissions

- Incremental; Progressive; Transformational scenario
- Scenario comparison
- Base station CO2 emissions per mobile subscriber

### 4. Enhancing the Network

#### Introduction

#### How can Power Wastage be Reduced?

- Network planning; Increasing base station coverage/Reduce inefficiency in PA; Reducing air conditioning; Using feederless sites and remote radio heads; Improving efficiency within the cable; Energy saving/ Standby; Remote monitoring; Site energy efficiency; Network sharing

### 5. Base Station Power Consumption & Electricity Costs

#### Implied Cost of Base Station Electricity

- Global average split by source

#### Power Output

- Power output per base station; Total mobile base station power consumption: incremental; progressive; transformational scenario

#### Cost of Electricity

- Implied cost per kWh (\$) of base station electricity; Total operator base station electricity costs; Total costs in relation to operator-billed revenues: incremental; progressive; transformational scenario
- Base station electricity costs: scenario comparison
- Base station electricity usage per mobile subscriber

### 6. Environmentally Sustainable Business Practice

#### Introduction

#### Environmental Management

- Waste management: network-related waste; tertiary waste

#### Teleconferencing and Teleworking

- Case study: TelePresence

#### Greener Transport

- Greener cars; Offset fleet emissions; Car pooling; Alternative means of travel

#### Efficiencies in Online Data Storage

- Case studies: AT&T

#### Smart Networks

#### Paperless Billing



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## author profile

Dr Windsor Holden is Principal Analyst with Juniper Research. He is responsible for developing Juniper Research's report portfolio and designing a forthcoming range of market intelligence services focusing on the mobile content market.

Dr Holden has written extensively on mobile content, emerging telecoms markets and digital TV. He is also a regular conference speaker and a former Research Fellow of the Institute of Communication Studies, University of Leeds.

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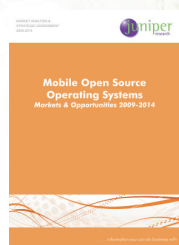
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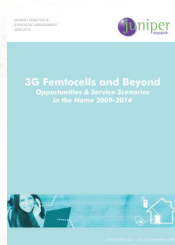
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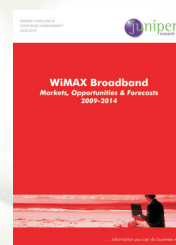
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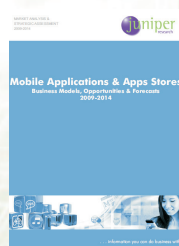
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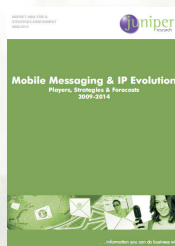
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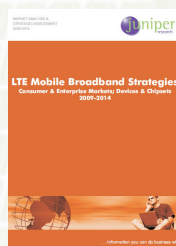
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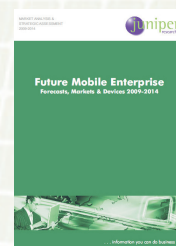
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